Seven Locks Road Bikeway and Sidewalk Traffic Analysis

Montrose Road to Bradley Boulevard

August 2006

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I. INTRODUCTION

The Montgomery County Department of Public Works and Transportation (DPWT) requested a traffic study be performed as part of the facility planning study for Seven Locks Road in Potomac, Maryland. The purpose of the traffic study is to:

- Document the existing roadway geometry including typical roadway cross-section, location of existing sidewalks and bicycle provisions, bus stops, and intersection traffic control;
- Collect weekday and weekend traffic data including volume and type of vehicular traffic, as well as pedestrian and bicycle volumes;
- Evaluate capacity and Level of Service (LOS) at critical intersections along Seven Locks Road including Bradley Boulevard, Democracy Boulevard, Grand Teton Drive, Muirfield Drive, Bells Mill Road, Tuckerman Lane and Montrose Road;
- Review accident history and identify safety deficiencies;
- Develop conceptual roadway improvements to provide a Class I/Class II bicycle facility along with a continuous sidewalk facility. The facility will connect numerous educational, religious, residential, commercial and recreational uses within the corridor, and be designed for all user types; and
- Identify spot safety and operational improvements based on accident and capacity analysis such as provision of left-turn bypass lanes and speed change lanes.

The limits of the study are Seven Locks Road from Bradley Boulevard to the south to Montrose Road to the north, and Montrose Road from Seven Locks Road east to the I-270 bridge as shown in **Figure 1**.

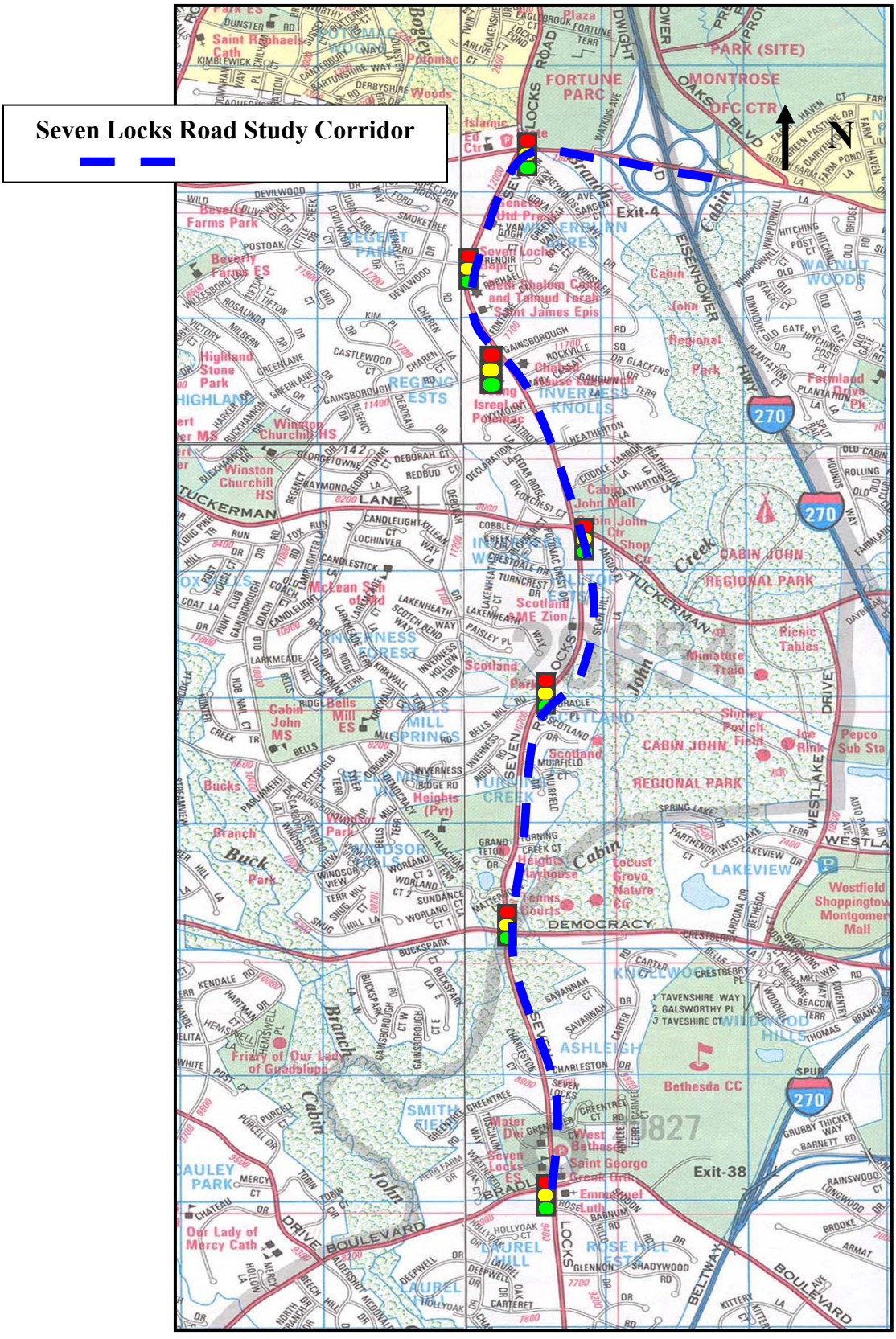
Data collected for this study includes vehicular, pedestrian and bicycle traffic volumes, vehicular classification data, existing roadway geometry such as lane widths, bicycle provisions, sidewalks, intersection traffic control and turn lane storage length, bus stop locations, speed limits, midblock access points and accident data. The analysis includes peak hour volumes, intersection capacity and level of service analysis, accident analysis, and auxiliary lane (left-turn and speed change) warrants.

The study is performed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), 2003 edition, the Institute of Transportation Engineers (ITE) Manual on Traffic Engineering Studies, and the American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets, 2001.

II. TRAFFIC ANALYSIS AREA AND LOCATION

Located in the Potomac Area of Montgomery County, Seven Locks Road is classified by the Sector Plan as an arterial roadway and connects the City of Rockville to the north with the Cabin John Area to the south. Seven Locks Road is primarily a two-way two lane open-section roadway, with a posted speed limit of 35 miles per hour. However the roadway widens at the major intersections of Democracy Blvd, Bradley Blvd and

Figure 1. Seven Locks Road Study Area Map (not to scale)



and Montrose Road to provide additional through and turn lanes.

Intersections located within the study limits of Seven Locks Road include:

- Seven Locks Road at Bradley Boulevard (MD 191)
- Seven Locks Road at Democracy Boulevard
- Seven Locks Road at Grand Teton Drive
- Seven Locks Road at Muirfield Drive
- Seven Locks Road at Bells Mill Road/ Oracle Place
- Seven Locks Road at Tuckerman Lane
- Seven Locks Road at Gainsborough Road
- Seven Locks Road at Postoak Road
- Seven Locks Road at Montrose Road

All of these intersections are analyzed in the report.

III. EXISTING CONDITIONS

A. Roadway Geometry

1. Lane Configuration and Traffic Control

Intersection lane configuration diagrams are included in **Appendix A.** All of the study intersections are controlled by a traffic signal except for Grand Teton Drive and Muirfield Drive (see Figure 1). These intersections are controlled by a stop sign on the minor street.

2. Typical Sections

Typical sections were measured along Seven Locks Road. Lane widths, sidewalk widths, parking restrictions, posted speed limits, turn lane storage lengths and bus stops were all noted. Detailed sketches are included in **Appendix B** for the following locations:

- Between Montrose Road and Gainsborough Road
- Between Gainsborough Road and Tuckerman Lane
- Between Tuckerman Lane and Bells Mill Road
- Between Bells Mill Road and Democracy Boulevard
- Between Democracy Boulevard and Bradley Boulevard

Figure 2 illustrates the location of existing sidewalk facilities. Approximately 35% of the study corridor has sidewalks. **Figure 3** illustrates existing bus stop and unsignalized crosswalk locations. There are over 24 bus stops along Seven Locks Road, which is served by Montgomery County Ride-On Bus Routes 36, 38 and 47. Marked crosswalks are provided at all signalized intersections except Bells Mill Road.

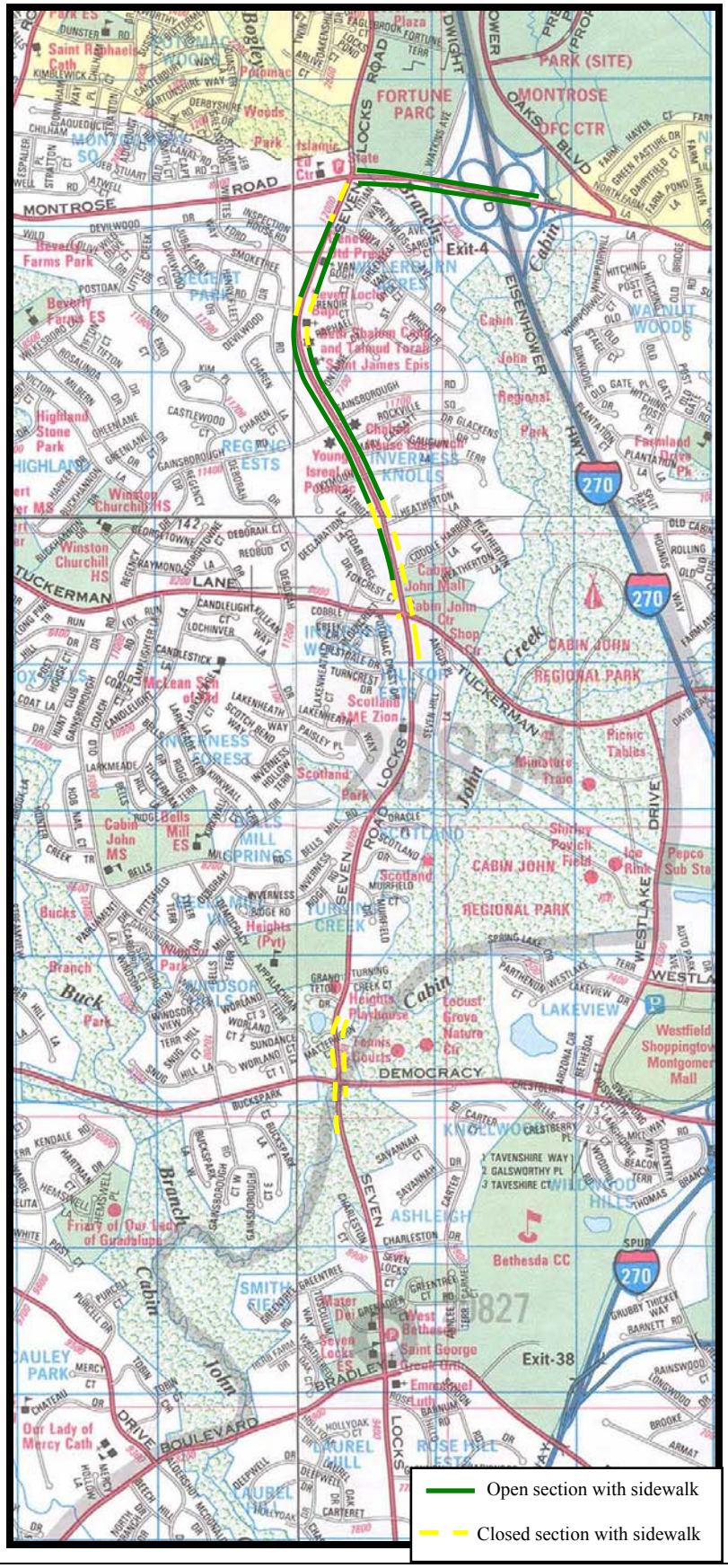


Figure 2. Existing Sidewalk Locations

Figure 3. Existing Bus Stop and Unsignlized Crosswalk Locations

B. Traffic Volumes

Recent peak hour traffic volume data including vehicular and pedestrian volumes as well as vehicular classification data was provided by the County, and where not available collected in January and February of 2006.

Weekday data was evaluated for the intersections of Bradley Boulevard, Democracy Boulevard, Grand Teton Drive, Muirfield Drive, Bells Mill Road, Tuckerman Lane and Montrose Road. Supplemental weekend vehicular, bicycle and pedestrian traffic data was obtained also in January and February of 2006 at Democracy Boulevard, Tuckerman Lane, Gainsborough Road, and Montrose Road to account for adjacent recreational, educational or religious land uses that may generate pedestrian and bicycle traffic.

Figures 4a and 4b summarize the existing weekday and weekend peak hour traffic volumes including total weekend pedestrian and bicycle traffic volumes; detailed traffic data is included in **Appendix C**.

The highest total peak hour vehicular volume, of 4,302 vehicles, was recorded at the intersection of Seven Locks Road and Montrose Road during the weekday PM peak. The highest total peak hour pedestrian traffic volume, of 211 pedestrians, was recorded at the intersection of Seven Locks Road and Gainsborough Road on a Saturday. The highest total peak hour bicycle traffic volume, of 171 bicyclists, was recorded at the intersection of Seven Locks Road and Tuckerman Lane also on a Saturday.

Vehicle classification data was collected using automated data collection equipment for 7 consecutive 24-hour days along Seven Locks Road south of Montrose Road and north and south of Democracy Boulevard. Average Daily Traffic along the study corridor is 16,500 vehicles per day based on the data collected. Classification data is summarized for an average weekday 24-hour period, a weekday AM and PM peak period, and an average weekend period. The results of the classification counts are summarized in **Table 1.**

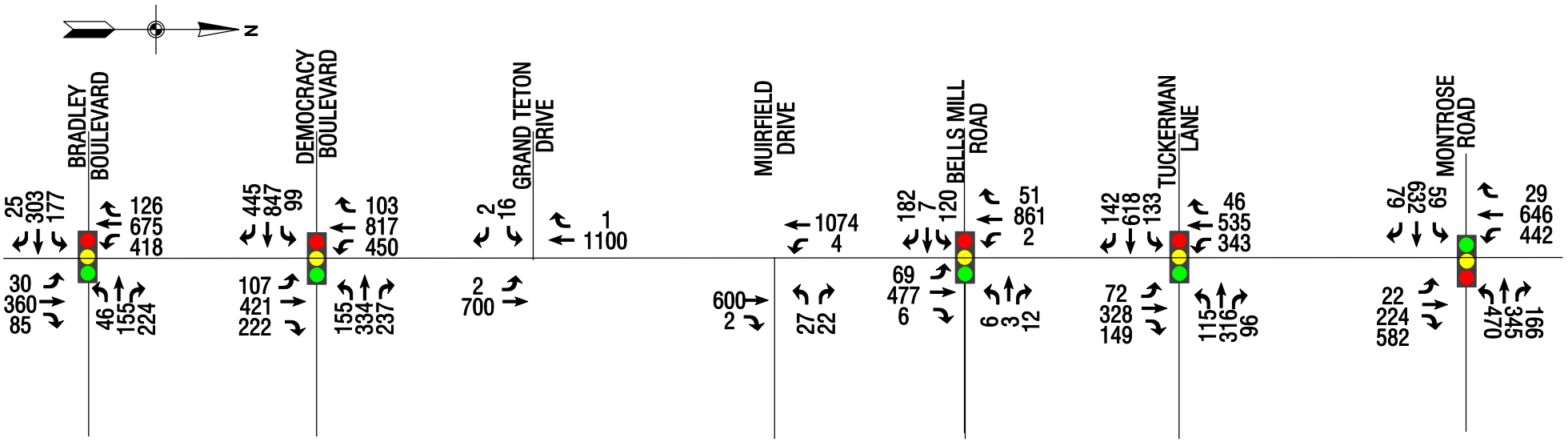
Table 1. Seven Locks Road Vehicle Classification Summary – Total of Both Directions

Location	Classification	24 Hour	Weekday	Weekday AM Peak	Weekday PM Peak	Weekend
.15 Mile South of Montrose Rd	1-4	94.3 %	93.8 %	92.4 %	95.5 %	95.8 %
	5+	6.0 %	6.3 %	8.0 %	4.9 %	4.5 %
.20 Mile North of Democracy Blvd	1-4	94.5 %	94.3 %	93.6 %	94.9 %	95.5 %
	5+	5.5 %	5.8 %	6.3 %	5.0 %	4.7 %
.20 Mile South of Democracy Blvd	1-4	95.6 %	95.4 %	94.6 %	96.0 %	96.4 %
	5+	4.5 %	4.5 %	5.4 %	4.0 %	3.6 %

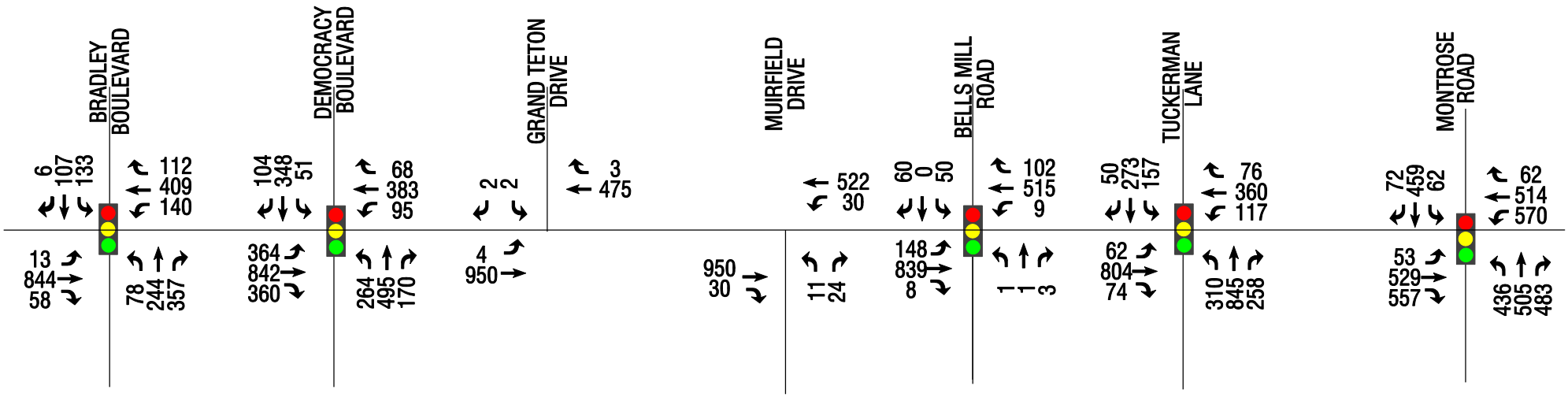
Classes 1-4: Motorcycles, passenger cars (2-axle), light trucks (2-axle) and buses (2-axle)
Classes 5+: Single unit trucks (2-3 axles), single- and multi- trailer trucks (4 or more axles)

The results of the vehicle classification analysis reveal the following:

- Over a typical 24-hour weekday period, approximately 94%-96% of the vehicles along Seven Locks Road fall within vehicle Classifications 1 through 4



AM PEAK HOUR



PM PEAK HOUR

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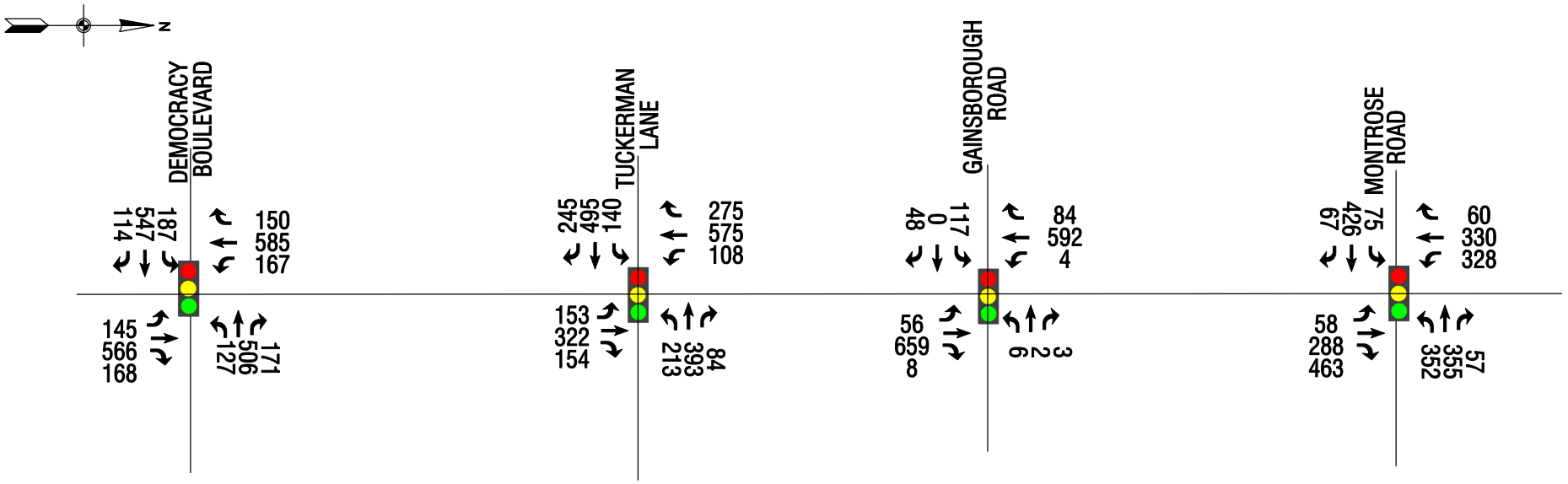
Seven Locks Road

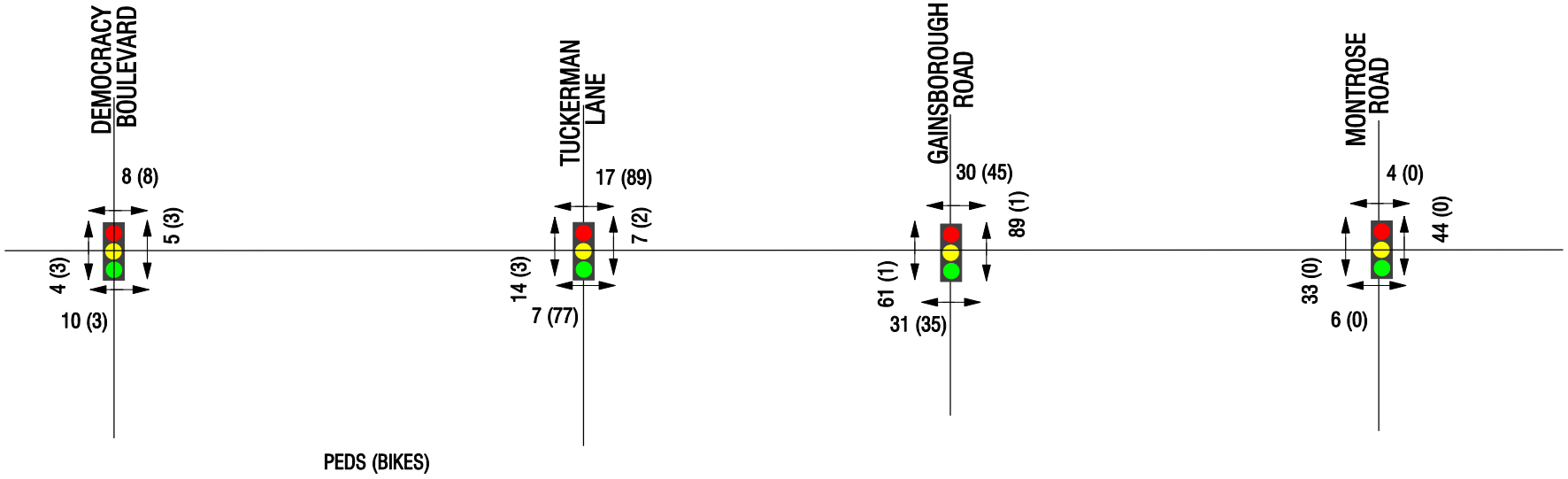
Existing Balanced Peak Hour Traffic Volumes – WEEKDAY

Figure 4a

Not to Scale



SATURDAY - PEAK HOUR VEHICULAR TRAFFIC



SATURDAY - PEDESTRIAN AND BICYCLE TOTALS

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Seven Locks Road

Existing Peak Hour Traffic Volumes – SATURDAY

Figure 4b

Not to Scale

- (motorcycles, passenger cars, light trucks and buses). The remaining 4%-6% of vehicles are heavy vehicles (single unit trucks, single-trailer trucks and multi-trailer trucks).
- Over a typical 24-hour Saturday, 95%-96% of the vehicles along Seven Locks Road fall within vehicle Classifications 1 through 4.

C. Capacity and Level of Service

The Critical Lane Volume (CLV) Analysis methodology was used to evaluate capacity for all of the intersections during the AM, PM and Saturday peak hours. Performance measures of effectiveness include critical lane volume (CLV), volume-to-capacity ratio (V/C ratio), and level of service (LOS). The total CLV for each peak period is calculated by combining the CLVs for the NB/SB movements and EB/WB movements. The CLV indicates the highest volume for a given approach lane configuration in a given direction. The v/c ratio is the ratio of current flow rate to the capacity of the facility. This ratio is often used to determine how sufficient capacity is at a given intersection. Generally speaking, a ratio of 1.0 indicates that the intersection is operating at capacity. A ratio of greater than 1.0 indicates that the facility is failing, as the number of vehicles exceeds the roadway capacity. The LOS is a letter designation that corresponds to a certain range of roadway operating conditions. The levels of service range from A to F, with A indicating the best operating conditions and F indicating the worst, or a failing, operating condition. The LOS thresholds are summarized in **Table 2;** results of the capacity analyses are summarized in **Table 3.** Detailed capacity analysis worksheets are included in **Appendix D.**

Table 2. Level of Service Parameters (Source: MD State Highway Admin.)

LOS	Volume (veh)	Expected Problems at Intersection
A	≤ 1000	Very low delay
B	>1000 and ≤ 1150	Short delay
C	>1150 and ≤ 1300	Number of vehicles stopping is significant
D	>1300 and ≤ 1450	Influence of congestion becomes more noticeable
E	>1450 and ≤ 1600	Limit of acceptable delay
F	>1600	Oversaturated and unacceptable

Table 3. Summary of Existing Intersection Capacity Analysis, AM (PM) [SAT[

Location	CLV	V/C Ratio	LOS
Seven Locks Rd at Bradley Blvd	1237 (1419) [---]	0.77 (0.89) [---]	C (D) [---]
Seven Locks Rd at Democracy Blvd	1363 (1302) [1264]	0.85 (0.81) [0.79]	D (D) [C]
Seven Locks Rd at Grand Teton Dr	1121 (962) [---]	0.70 (0.60) [---]	B (A) [---]
Seven Locks Rd at Muirfield Drive	1135 (1045) [---]	0.71 (0.65) [---]	B (B) [---]
Seven Locks Rd at Bells Mill Road	1126 (912) [---]	0.70 (0.57) [---]	B (A) [---]
Seven Locks Rd at Tuckerman Lane	1553 (1617) [1334]	0.97 (1.01) [0.83]	E (F) [D]
Seven Locks Rd at Gainsborough Rd	-- (--) [879]	-- (--) [0.55]	-- (--) [A]
Seven Locks Rd at Montrose Road	1110 (1301) [909]	0.69 (0.81) [0.57]	B (D) [A]

Based on the results of the analysis, all of the existing intersections are operating at LOS C or better during both the morning, evening and Saturday peak hours, with the exception of the following intersections: Bradley Boulevard (LOS D during PM peak hour), Democracy Boulevard (LOS D during AM and PM peak hours), Tuckerman Lane (LOS E, F and D during AM, PM and Saturday peak hours) and Seven Locks Road at Montrose Road (LOS D during PM peak hour).

It should be noted that according to the July 2004 *Local Area Transportation Review Guidelines* published by the Maryland National-Capital Park and Planning Commission (M-NCPPC), Seven Locks Road falls within the Potomac Subregion policy area. In this policy area, CLVs of up to 1,475 vehicles per hour are considered acceptable to maintain existing congestion standards. Based on this standard, only the intersection of Seven Locks Road and Tuckerman Lane exceeds the CLV standard during the AM and PM peak hours.

D. Accident Analysis

The accident analysis is based on data provided by the Montgomery County DPWT, Traffic Engineering and Operations Section for the period of January 1, 1997 to December 31, 2003. Accident data was analyzed at the intersections of Bradely Boulevard, Democracy Boulevard, Grand Teton Drive, Muirfield Drive, Bells Mill Road, Tuckerman Lane and Montrose Road. Detailed accident data and summary worksheets are included in **Appendix E**.

There were 301 police reported accidents in the Seven Locks Road study corridor during the study period; 174 (58%) of these accidents occurred at the seven study intersections. Overall, the intersection with the highest total number of accidents was Seven Locks Road and Tuckerman Lane, with 48 total accidents over the seven-year study period. The second highest total number of accidents at an intersection with the study area occurred at Seven Locks Road and Democracy Boulevard (46), followed by Montrose Road (23), Bradley Boulevard (20), and Bells Mill Road (17). The fewest accidents were reported at the intersection of Seven Locks Road and Grand Teton Drive, with a total of seven accidents between 1997 and 2003. **Figure 5** summarizes the total number of accidents at each intersection.

As shown in **Figure 6**, the most prevalent accident type in the Seven Locks Road study corridor is a rear-end, accounting for nearly 40% of all collisions, followed by left-turn (over 25%), fixed object (nearly 10%) and angle collisions (over 8%). ***There were a total of 11 pedestrian (3.7%) and two bicycle (0.7%) accidents throughout the study corridor.*** Five pedestrian accidents and two bicycle accidents were reported at the study intersections between 1997 and 2003.

It should be noted that supplemental accident data was provided by the County, and since 2003 there has been one pedestrian fatality and one bicycle fatality within the study corridor. The bicycle collision occurred on 9/27/04 at 1:20 PM just north of Bradley Blvd. The bicyclist was found to be at fault. The pedestrian collision occurred on 3/30/04 at 9:30 PM just south of Scotland Drive. The pedestrian was found to be at fault.

Figure 5. Seven Locks Road Intersection Accident Summary – Number of Accidents 1997 – 2003

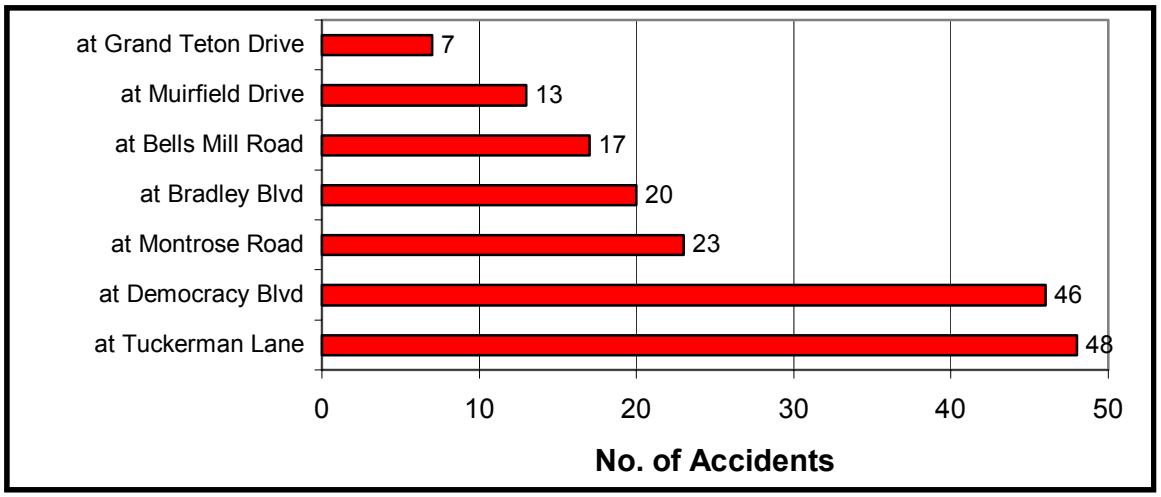
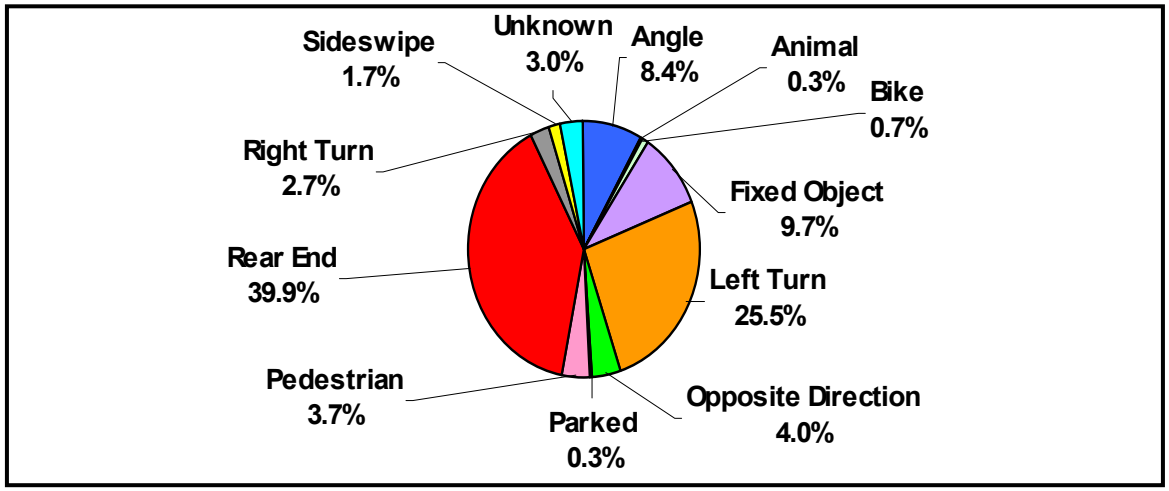
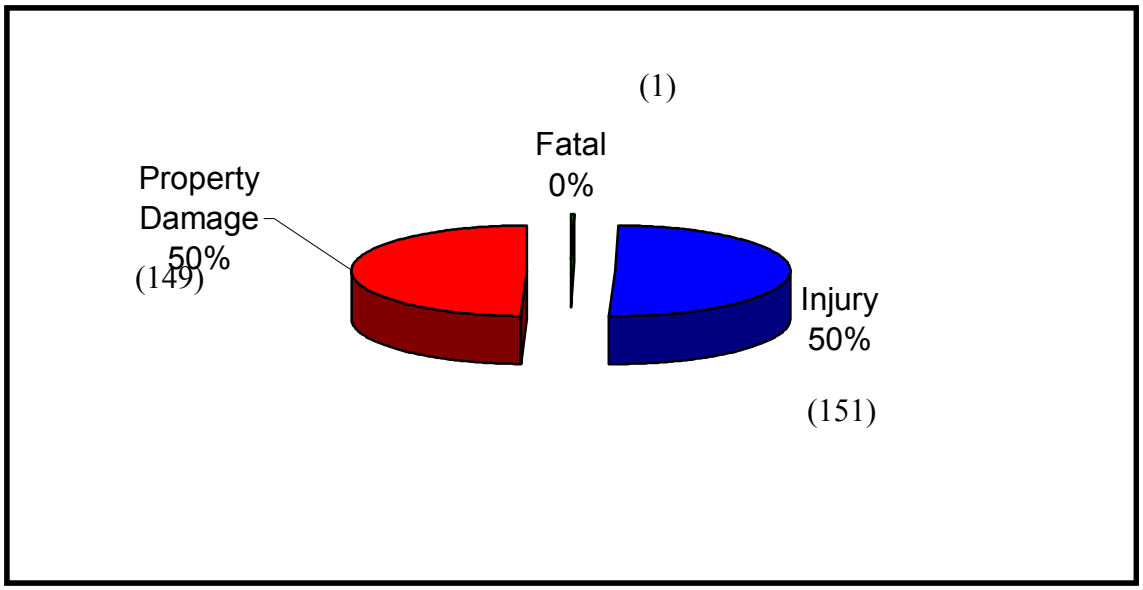


Figure 6. Summary of Accident Types in the Seven Locks Study Corridor, 1997-2003



Fifty percent (50%) of all accidents in the study corridor were property damage only and the remaining (50%) of the accidents resulted in injury. ***One vehicular fatality was reported between Charleston Court and Seven Locks Court (between Bradley Boulevard and Democracy Boulevard) during the seven-year study period.*** The fatality involved a head-on collision between a northbound recreational vehicle and southbound motorcycle. **Figure 7** summarizes the accident severity distribution within the Seven Locks Road study corridor during the seven-year study period.

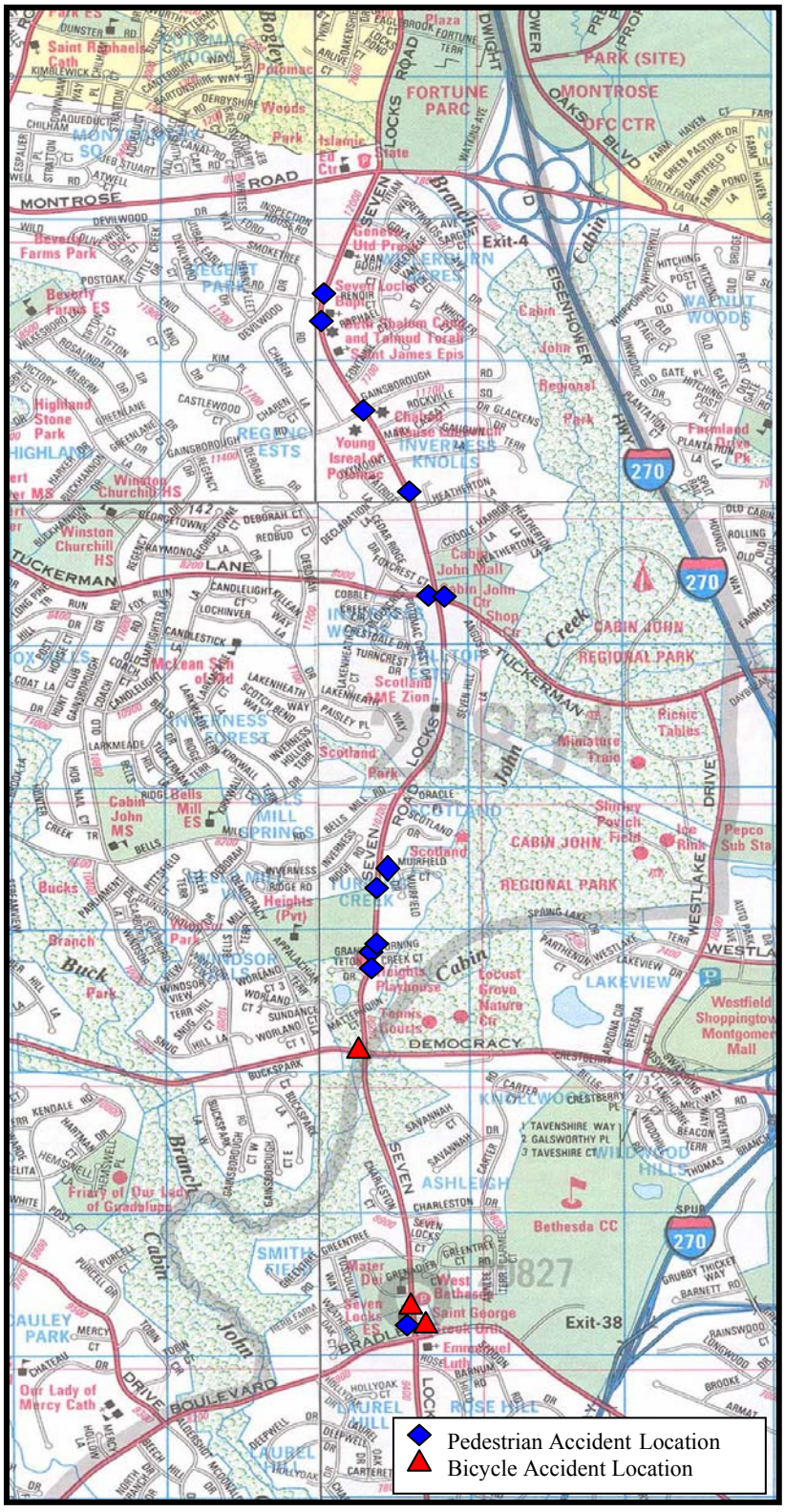
Figure 7. Summary of Accident Severity in the Seven Locks Study Corridor, 1997-2003



Other notable findings include:

- The most commonly cited probable cause of accidents in the study corridor was failure to give full attention (60%). Failure to give full attention was also the highest reported cause at the seven study intersections (41%), followed by failure to yield right-of-way (11%), influence of alcohol and drugs (4%), and too fast for conditions and failure to obey traffic signal (2.3% each).
- The most commonly cited probable cause of accidents in the study corridor was failure to give full attention (60%). Failure to give full attention was also the highest reported cause at the seven study intersections (41%), followed by failure to yield right-of-way (11%), influence of alcohol and drugs (4%), and too fast for conditions and failure to obey traffic signal (2.3% each).
- The locations of the 12 pedestrian and three bicycle-related accidents reported during the seven-year study period as well as in supplemental accident reports are illustrated in **Figure 8**. Reported pedestrian-related accidents occurred at or near the intersections of Grand Teton Drive (3), Tuckerman Lane (2), Postoak Road (2), Scotland Drive (1), Gainsborough Road (1) and Bradley Boulevard (1). Reported bicycle-related accidents occurred at or near the intersections of Democracy Boulevard (1) and Bradley Boulevard (2).
- Nearly half (44%) of all accidents occurred between 10 AM and 4 PM, and 27% of all collisions occurred on wet pavement.

Figure 8. Pedestrian and Bicycle Accident Locations



IV. BICYCLE AND PEDESTRIAN COMPATIBILITY ANALYSIS

A. Potomac Subregion Sector Plan Recommendations

The Potomac Subregion Sector Plan was approved and adopted in April 2002. Seven Locks Road is designated as a two-lane arterial roadway with an 80-foot right-of-way. The Sector Plan recommends the completion of a Class I/Class II bikeway along Seven Locks Road through the entire study corridor. A Class I bikeway is defined as an eight-foot to ten-foot wide shared-use path for bicycles and pedestrians that is physically separated from motorized traffic. A Class II bikeway is defined as a four to five-foot wide portion of roadway that is designated for bicycle use by signing and/or striping. Additional Class I bikeway facilities are recommended on intersecting roadways including Tuckerman Lane from Falls Road to Seven Locks Road, and on Montrose Road from Seven Locks Road to Falls Road.

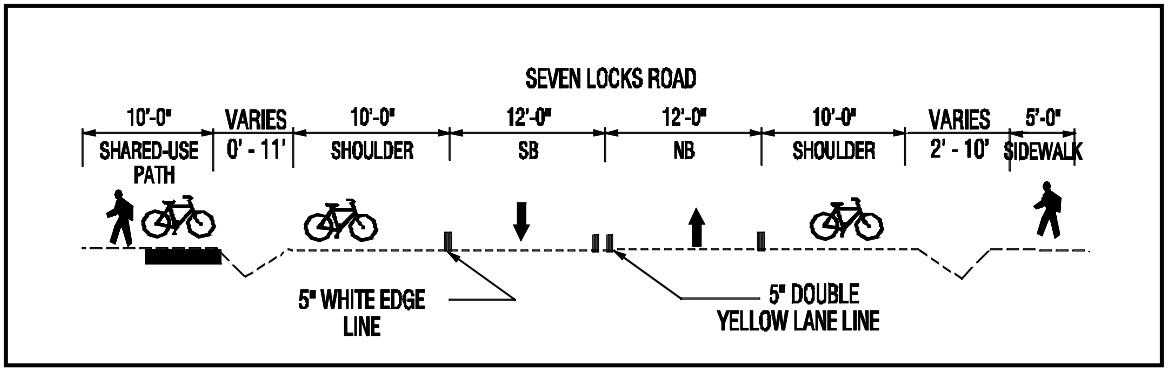
One specific intersection improvement noted in the Sector Plan was the construction of a northbound and eastbound auxiliary through lanes at Seven Locks Road and Tuckerman Lane. This geometric improvement would provide a LOS B in the AM and C in the PM, satisfying the CLV congestion standard.

B. Typical Section and Right-of-Way

Alternative typical roadway cross-sections were developed to evaluate the feasibility of providing bicycle and sidewalk facilities along Seven Locks Road. An effort was made in developing the concepts to minimize the impact to private property, environmental features, drainage structures, earthwork and construction cost. A conceptual typical section for each street portion is discussed below.

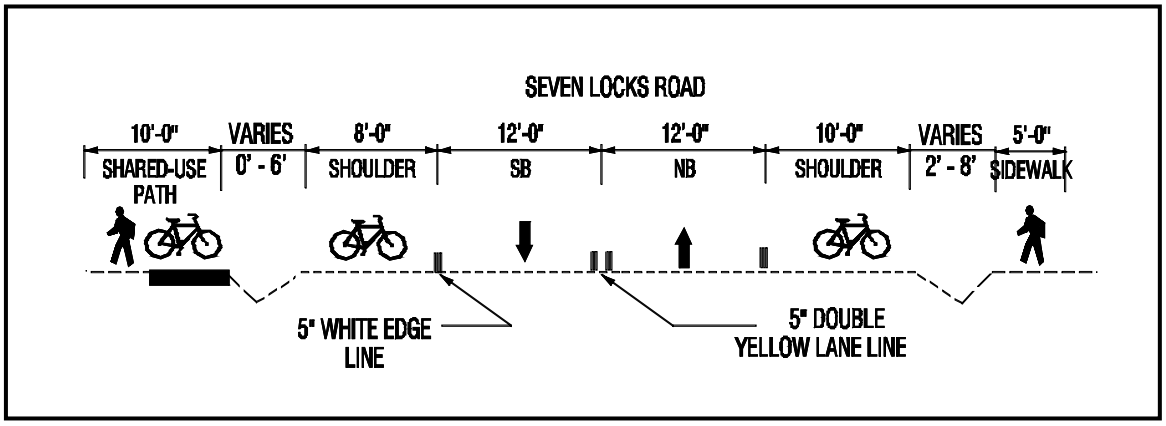
1. Montrose Road to Gainsborough Road: The existing typical roadway section is 44' from edge of pavement to edge of pavement, with twelve-foot travel lanes and ten foot shoulders. The roadway is primarily open-section, with a varying green space of two to fifteen feet separating the existing edge of pavement from the sidewalks. Widening the existing sidewalk on the west side of Seven Locks Road to ten feet would create a shared-use path (Class I), and improving the shoulder area would provide four-foot on-road (Class II) bicycle lanes in each direction. **Figure 9** illustrates a proposed typical section.

Figure 9. Proposed Montrose Rd to Gainsborough Rd Typical Section



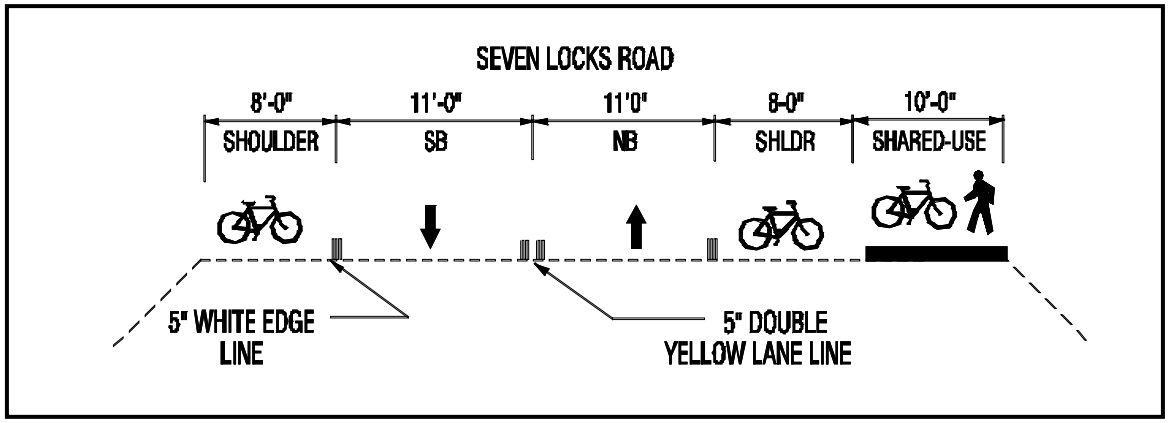
2. Gainsborough Road to Tuckerman Lane: The existing typical roadway section is 43' from edge of pavement to edge of pavement, with twelve-foot travel lanes and eight to ten foot shoulders. The roadway is primarily open-section, with a varying green space of two to ten feet separating the existing edge of pavement from the sidewalks. Widening the existing sidewalk on the west side of Seven Locks Road to ten feet would provide a shared-use path (Class I), and improving the shoulder area would provide four-foot on-road (Class II) bicycle lanes in each direction. **Figure 10** illustrates a proposed typical section.

Figure 10. Proposed Gainsborough Rd to Tuckerman La Typical Section



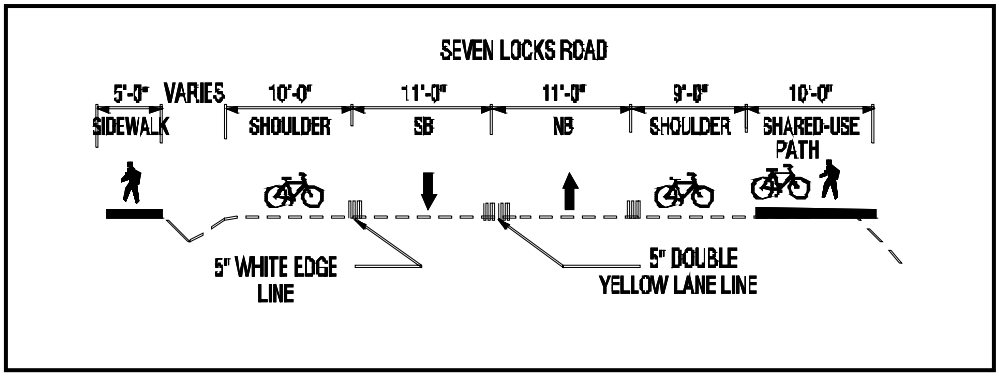
3. Tuckerman Lane to Bells Mill Road: The existing typical roadway section is 42' from edge of pavement to edge of pavement, with twelve-foot travel lanes and eight to ten foot shoulders. The roadway is primarily open-section, with no existing sidewalks. Narrowing the travel lanes to eleven feet and shoulders to eight feet, while widening six feet to the east would provide a ten-foot wide shared-use path, and improving the remaining shoulder areas would provide four-foot on-road (Class II) bicycle lanes in each direction. It should be noted that the proposed widening may result in additional right-of-way, drainage and cost impact. **Figure 11** illustrates a proposed typical section.

Figure 11. Proposed Tuckerman La to Bells Mill Rd Typical Section



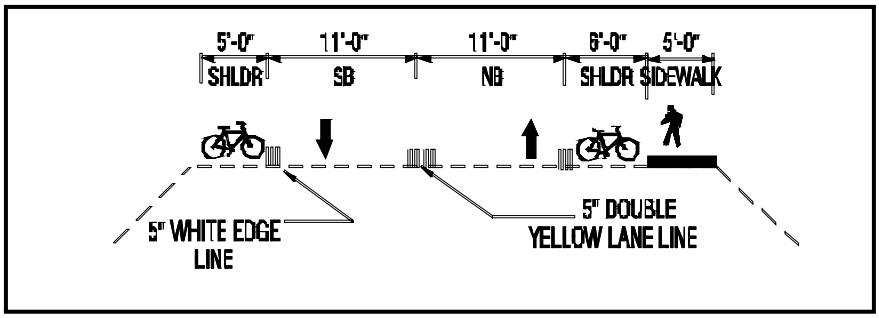
4. Bells Mill Road to Democracy Boulevard: The existing typical roadway section is 45' from edge of pavement to edge of pavement, with twelve foot travel lanes and ten to eleven foot shoulders. The roadway is primarily open-section, with an existing sidewalk on both the east and west sides from Democracy Boulevard north to approximately Grand Teton Drive. Narrowing the travel lanes to eleven feet and the shoulders to nine feet, while widening an additional six feet to the east would provide a ten-foot shared use path (Class I), and improving the shoulder areas would provide four-foot on-road (Class II) bicycle lanes in each direction. It is also suggested to widen to the west and construct a 5' sidewalk on the west side of Seven Locks Road north to the Heights School entrance to improve access to the school. It should be noted that the proposed widening may result in additional right-of-way, drainage, and cost impact. **Figure 12** illustrates a proposed typical section.

Figure 12. Proposed Bells Mill Rd to Democracy Blvd Typical Section



5. Democracy Boulevard to Bradley Boulevard: The existing typical roadway section is 38' from edge of pavement to edge of pavement, with twelve to thirteen-foot travel lanes and six to seven-foot shoulders. The roadway is primarily open-section, with an existing sidewalk on the west side for several hundred feet south of Democracy Boulevard. Narrowing the travel lanes to eleven feet and shoulders to six feet, while constructing a new 5' sidewalk on the east side of Seven Locks would provide pedestrian amenities, and improving the shoulder areas would provide four-foot on-road (Class II) bicycle lanes in each direction. It does not appear feasible to provide a shared-use path (Class I) along this segment without substantial right-of-way, environmental and cost impact. **Figure 13** illustrates a proposed typical section.

Figure 13. Proposed Democracy Blvd to Bradley Blvd Typical Section



In summary, a shared-use path (Class I) bicycle facility could be provided along the west side of Seven Locks Road between Montrose Road and Democracy Boulevard, and a on-road (Class II) bicycle facility, with shared bicycle lanes through major intersections, could be provided from Montrose Road to Bradley Boulevard. Suggested striping for shared bicycle lanes through intersections as illustrated in the MUTCD is shown below in **Figure 14**.

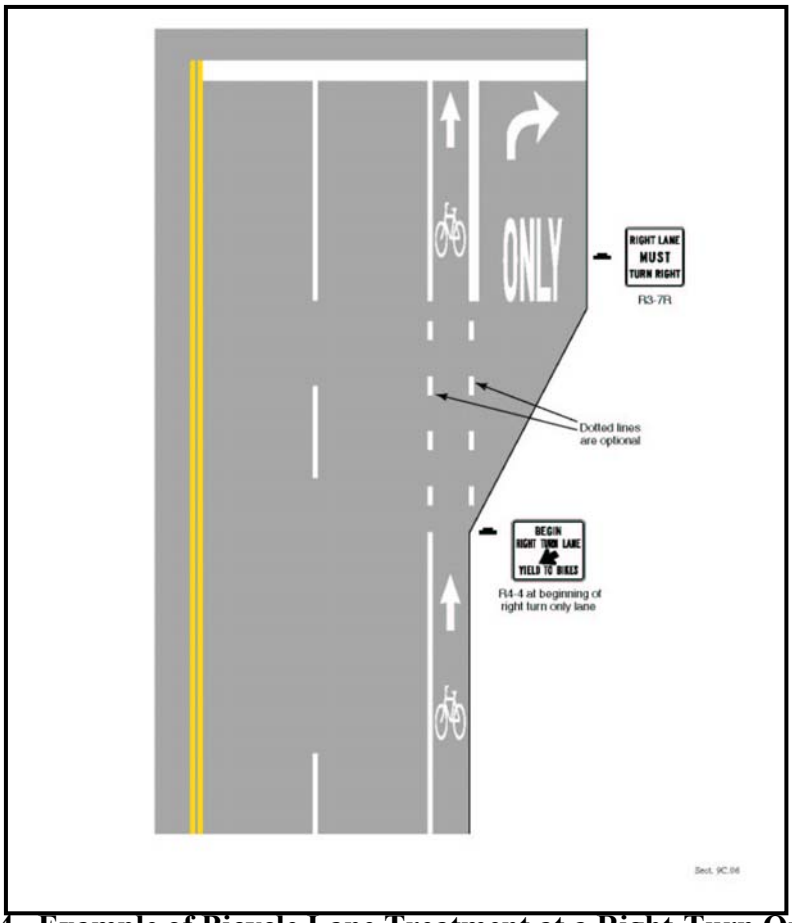


Figure 14. Example of Bicycle Lane Treatment at a Right-Turn Only Lane

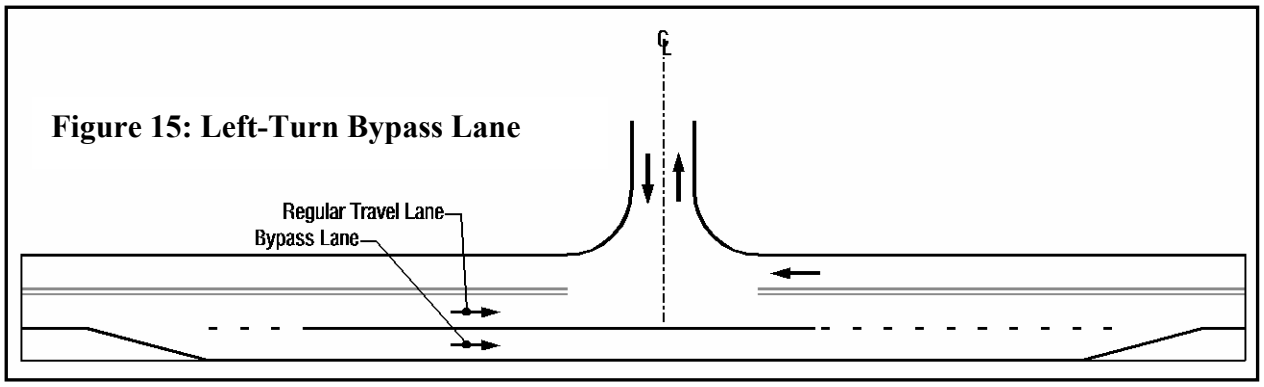
V. OPERATIONAL AND SAFETY IMPROVEMENTS

The following analysis focuses on the need for left-turn (bypass) lanes and speed change lanes at the unsignalized T-intersections of Seven Locks Road and Grand Teton Drive and Seven Locks Road and Muirfield Drive. The signalized intersection of Seven Locks Road and Bells Mill Road is excluded from this analysis due to the existing provision for left-turn lanes.

A. Left-turn Bypass Lanes

Left-turn bypass lanes are a special type of left-turn lane appropriate for T-intersections that allow for through traffic not to shift to the right except when left-turning vehicles are present. A schematic left-turn bypass lane is illustrated in **Figure 15**. Based on AASHTO guidelines, several factors should be considered in evaluating the need for a

left-turn bypass lane, including the percentage of left-turning traffic, available sight distances, and accident experience.



Left turn bypass lanes are suggested when the percent of left-turning traffic exceeds five-percent of the total intersection traffic (AASHTO Exhibit 9-75 Guide for Left Turn Lanes on Two-lane Highway). Left-turn volumes for both Grand Teton Drive and Muirfield Drive do not exceed two-percent of total intersection volume during any peak hour. Left-turn bypass lanes should also be considered when adequate sight distances for the advancing movement are not available. Clear sight distance is available for advancing movements at both intersections. Lastly, left-turn bypass lanes are suggested when accident experience indicates four or more rear-end or left-turn accidents in a 12-month period. At Grand Teton Drive only seven total accidents occurred in the seven year study period with no more than two accidents in a single year. A total of 13 accidents including four in a twelve-month period were reported at Muirfield Drive, and 60% of all accidents were rear-end or left-turn. Based on the volumes, available sight distances and accident experience, left turn bypass lanes are not suggested at Grand Teton Drive. Left-turn bypass lanes are not suggested for Muirfield Drive, based on volumes and available sight distances. Furthermore this road is built-out and future traffic growth is not anticipated.

B. Speed Change Lanes

Similar considerations should be used in evaluating the need for acceleration and deceleration lanes. The posted speed limit on Seven Locks Road is 35 miles per hour, which would not be considered a high-speed roadway (greater than 40 miles per hour). In addition, clear sight distance is available for vehicles exiting Grand Teton Drive and Muirfield Drive. Lastly, the right turn volumes in and out of Grand Teton Drive and Muirfield Drive represent less than two-percent of total intersection traffic volumes during any peak hour. Speed change lanes are not suggested at either Grand Teton Drive or Muirfield Drive.

C. Safety Countermeasures:

The following safety countermeasures were developed to mitigate specific vehicular and pedestrian accident patterns within the Seven Locks Road study corridor. A more detailed operational analysis may be required at specific locations to ensure appropriate applications. These measures include:

- Upgrading traffic signal heads at all signalized intersections to black-faced LED to improve visibility and reduce rear-end accidents at all signalized intersections as part of any signal modifications or installations along the study corridor.
- Evaluating vehicular and pedestrian clearance intervals at all signalized intersections to assure adequate signal timing and reduce rear-end collisions and enhance pedestrian and bicycle safety.
- Consider fully restricting conflicting movements, specifically right turns on red during daytime hours, at major intersections including Postoak Road, Gainsborough Road, Tuckerman Lane, Democracy Boulevard and Bradley Boulevard to enhance pedestrian safety.
- Installing bicycle signing and pavement markings to enhance motorists awareness of bicycle activity and provide guidance for bicyclists on Seven Locks Road and all minor street approaches.
- Installing pedestrian signals, handicapped ramps and marked crosswalks at Bells Mill Road (if warranted in anticipation of future pedestrian/ bicycle provisions).

V. CONCLUSION

The results of the traffic analysis reveal that Seven Locks Road is a critical link in the Potomac area transportation network, providing direct access to ten religious institutions, four schools, a shopping center, regional park and numerous residential communities. Analysis indicates one intersection, Seven Locks Road and Tuckerman Lane, currently operates at an unacceptable level of service. Over 24 bus stops are located within the study corridor. Substantial bicycle and pedestrian volumes were observed; however bicycle and sidewalk facilities are not provided continuously along Seven Locks Road. Rear-end and left-turn vehicular collisions are the prevalent accident type; eleven pedestrian and two bicycle accidents were reported within the past seven years. Approximately six percent of all traffic is heavy vehicles.

An 80’ right-of-way and two-lane roadway is recommended in the Potomac Subregion Sector Plan, along with a Class I/ Class II commuter and recreational bicycle facility. A shared-use off-road (Class I) path could be provided between Montrose Road and Democracy Blvd, and on-road (Class II) bicycle lanes, with special delineation through major intersections, is suggested from Montrose Road to Bradley Boulevard. Additional northbound and eastbound through lanes are identified in the Sector Plan at the intersection of Seven Locks Road and Tuckerman Lane. Auxiliary lanes are not recommended at Grand Teton Drive or Muirfield Drive. Lastly, several safety measures could be implemented on the roadway network to enhance vehicular and pedestrian safety including upgraded signal equipment updating signal timing for pedestrian and bicycle clearance, restricting right turns on red at signalized intersection, and new bicycle and pedestrian signing, marking and signals.

In summary, the new bicycle and sidewalk facilities, along with identified safety countermeasures and intersection improvements will provide a more balanced and multimodal transportation network along Seven Locks Road. The improvements support Sector Plan recommendations, and will provide connectivity both within the corridor and to other proposed and existing bicycle and sidewalk facilities intersecting the corridor.